AMENDMENTS TO THE CLAIMS

A detailed listing of all claims that are, or were, in the present application, irrespective of whether the claim(s) remains under examination in the application are presented below. The claims are presented in ascending order and each includes one status identifier. Those clai:ns not cancelled or withdrawn but amended by the current amendment utilize the following no.ations for amendment: 1. deleted matter is shown by strikethrough for six or more charact:.is and double brackets for five or less characters; and 2. added matter is shown by underlining.

1.   (Currently Amended) An integrated evaluation and simulation system for a w.:apon system having a plurality of elements including at least one munition element, comprising:

a computer system programmed to implement a causal network model comprising an integrated collection of analysis models representing a model-based description of the weapon system at a subsystem and component level resolution, individual elements of the causal network model weapon system being configured as nodes in the causal network suited to model having complex interactions and interrelationships with other nodes, including operational and lower-level requirements, system performance and design attributes, and constrained resources, [[and]] each node including at least one dyr:amic parameter for creating a virtual representation of the weapon system,

a control system operably coupled to said causal network, said control system adapted to control at least one state and at least one mode of operation of said integrated evaluation and simulation system and to control an optimization process that operates

upon said causal network model, said mode including a single-run mode, a dependencies mode, and a sensitivities modes,

said single run mode adapted to propagate selected inputs once through the causal network model to produce a set of intermediate and final results, the single run mode further adapted to provide for the changing of one or more of said selected inputs during operation;

said optimization process capable of determining a best set of design parameters that satisfy specified performance requirements and resource constraints, from among a set of user selected design parameters while causing an optimization of a weapon system's combat effectiveness as measured by loss exchange ratio computations,

said dependencies mode, for rapidly and visually identifying at least one interrelationship between design attributes and performance parameters within the causal network model by providing for a display of performance parameters affected upon a change to a user selected input value;

said sensitivities mode adapted to evaluate weapon system performance in terms of one or more design parameters in the causal network model by providing for the evaluation of effects on one or more performance parameters upon varying a user selected design parameter;

at least one virtual simulation system operably coupled to said causal network model and said control system by a virtual simulation system interface, said virtual simulation system interface serving as a conduit between said causal network and said virtual simulation system, the virtual simulation system interface adapted to return data

3

Application No. 09/324,512

structures from the virtual simulation system to the control system, said virtual simulation system adapted to simulate said weapon system, including a simulation of a lethality of the at least one munition element; and

a user interface operably coupled to at least said computer system to selectively input data into and receive information from, one or more of said causal network model, said control system and said virtual simulation system interface and receive information from said causal network model and said virtual simulation system.

2.   (Original) The system of claim 1, wherein said virtual simulation system comprises:

an operation simulator to simulate operations of said weapon system; and

an effectiveness simulator to evaluate the effectiveness of said weapon system in a simulated operational environment.

3-5.   (Canceled)

6.   (Currently Amended) The system of Claim [[3]] 1, wherein said control system includes an optimization routine that optimizes allocation of one or more selected constrained resources or design of one or more selected components or attributes of said weapon system by utilizing said causal network model.

7.   (Original) The system of claim 6 wherein said optimization routine implements a gradient search methodology to optimize allocation of one or more selected constrained resources or design of one or more selected components or attributes of said weapon system.

4

8.   (Original) The system of Claim 6, wherein said optimization routine optimizes allocation of at least a cost of said weapon system and a weight of said weapon system.

9.   (Original) The system of Claim 1, wherein said user interface has a menu driven graphical user interface.

10.   (Currently Amended) The system of Claim 1, wherein said user interface visually displays a <u>schematic</u> diagram of said causal network model, <u>representing a model based description of the weapon system at a subsystem and component level resolution, with individual elements of the weapon system depicted as nodes in the diagram, a connection between a first node and a second node describing said complex interactions and interrelationships between said pair of nodes, said diagram</u> having commonality with said causal network model.

11.   (Original) The system of Claim 1, wherein said user interface displays data in a modular configuration of three-dimensional plots or numerical values or tables, each plot, value or table being associated with one of a plurality of components or attributes of said weapon system.

12.   (Original) The system of Claim 1, wherein said causal network model communicates with said virtual simulation system via a series of data arrays.

13.   (Currently Amended) The system of Claim [[2]] 1, wherein said virtual simulation system is <u>selected from a group of virtual simulation systems consisting of an accredited</u> Ground

5

Wars ~~Combat Effectiveness~~ <u>Combat Effectiveness</u> ~~simulation~~ model, <u>an ARTQUIK model, and a NATO Reference Mobility Model II.</u>

14.   (Original) The system of Claim 1, wherein said causal network model includes a relational database to store data that define at least one interrelationship between a plurality of parameters of said causal network model or an operational performance and at least one parameter of said causal network model.

15.   (Original) The system of Claim 1, wherein said causal network model has a modular implementation and each module is represented by a separate subroutine.

16.   (Currently Amended) An integrated evaluation and simulation computer system for allocating resources across a system architecture of a weapon system having at least one munition element to optimize a combat effectiveness of said weapon system, said computer system comprising:

means for inputting data into and receiving information from said computer system <u>including an interlinked configuration of a control system, and a computer system generated causal network model having a plurality of analysis models wherein individual elements of the weapon system are configured as nodes;</u>

means for distributing data and information between said computer system and at least one virtual simulation system; [[and]]

means for creating a virtual representation of an optimally effective weapon system ~~based on a~~ by generating said causal network model of said weapon system representing individual elements of said weapon system as nodes having complex interactions and interrelationships with other nodes and that includes at least one dynamic parameter;

means for propagating selected inputs once through the causal network model in a single run mode to produce a set of intermediate and final results, the single run mode equipped with means for the changing of one or more of said selected inputs during operation;

means for determining a best set of design parameters that satisfy specified performance requirements and resource constraints, from among a set of user selected design parameters while causing an optimization of a weapon system's combat effectiveness as measured by loss exchange ratio computations,

means for rapidly and visually identifying at least one interrelationship between design attributes and performance parameters within the causal network model by providing means for a display of performance parameters affected upon a change to a user selected input value; means for evaluating weapon system performance in terms of one or more design parameters in the causal network model by providing for the evaluation of effects on one or more performance parameters upon varying a user selected design parameter;

means for acquiring and using said intermediate and final results, said best set of design parameters and said interrelationship between said design attributes and

performance parameters from said causal network to generate a virtual representation of an optimally effective weapon system; and

means for displaying a graphical representation of said system together with a fault indication.

17.   (Cancelled)

18.   (Currently Amended) In a computer system, a computer-readable storage media storing at least one computer program that operates as an integrated performance simulator for allocating resources across a system architecture of a weapon system having at least one munition element to optimize a combat effectiveness of said weapon system, said program comprising the steps of:

a) generating a causal network model comprising an integrated collection of analysis models representing a model-based description of the weapon system at a subsystem and component level resolution, individual elements of the weapon system being configured as nodes in the causal network suited to model complex interactions and interrelationships with other nodes, including operational and lower-level requirements, system performance and design attributes, and constrained resources, each node including at least one dynamic parameter for creating a virtual representation of the weapon system;

a)   storing a causal network model [[of]] representing individual elements of said weapon system as nodes having complex interactions and interrelationships with other nodes and that includes at least one dynamic parameter in said computer system;

b)   obtaining data necessary for said program to create a virtual representation of an optimally effective weapon system;

c)   pulsing said causal network model to create said virtual representation of said optimally effective weapon system by:

d)   propagating selected data once through the causal network model to produce a set of intermediate and final results;

e)   determining a best set of design parameters that satisfy specified performance requirements and resource constraints, from among a set of user selected design parameters to cause an optimization of a weapon system's combat effectiveness as measured by loss exchange ratio computations;

f)   identifying at least one interrelationship between user specified design attributes and performance parameters within the causal network model by providing for a display of performance parameters affected upon a change to a user selected input value;

g)   computing an effect on one or more user specified performance parameters upon varying a user selected design parameter;

h[[d]]) selectively sending said virtual representation to a virtual simulation system for simulating weapon system operations; and

i[[e]]) receiving information about the performance of said weapons system

19-20. (Canceled)